IN THE CLAIMS

1. (Original) A horizontal optical resonator type laser diode having an optical resonator horizontally with respect to a substrate surface, comprising:

a substrate of a semiconductor;

an active layer formed inside the semiconductor;

an optical resonator mirror formed on a semiconductor facet; and

a reflection film comprising a first insulator film formed in contact with the semiconductor facet as the optical resonator mirror and an insulator film layered on the first insulator film;

wherein the first insulator film comprises aluminum oxide lacking in oxygen and composition of aluminum oxide is Al_2O_{3-x} where $0.03 \leq x \leq 0.3$.

2. (Original) A laser diode according to claim 1, wherein composition of the aluminum oxide is Al_2O_{3-x} where $0.1 \leq x \leq 0.2$.

3. (Currently Amended) A laser diode according to claim 1 [[or 2]], wherein the active layer comprises a material containing aluminum.

4. (Original) A laser diode according to claim 3, wherein the aluminum content of the active layer has a compositional ratio of 10 at% or more relative to a group III element.

5. (Original) A laser diode according to claim 1, wherein an InP substrate is used for the semiconductor substrate.

6. (Original) A laser diode according to claim 1, wherein the first insulator film is aluminum oxynitride formed by adding aluminum nitride to an aluminum oxide film lacking in oxygen.

7. (Original) A laser diode according to claim 1, wherein total stress of the reflection

film defined by a sum of products of film thicknesses and internal stresses for all the layers is 150 Pa·m or less.

8. (Currently Amended) A laser diode according to ~~any one of claims~~ claim 1[[to 6]], wherein total stress in the reflection film is 100 Pa·m or less.

9. (Original) A method of manufacturing a horizontal optical resonator type laser diode having an optical resonator horizontal with respect to a substrate surface comprising the steps of:

providing a substrate of a semiconductor;

forming an active layer inside the semiconductor;

forming an optical resonator mirror on a facet of the semiconductor; and

forming a first insulator film in contact with the semiconductor facet as the optical resonator mirror and forming a reflection film formed by depositing an insulator film on the first insulator film;

wherein the first insulator film comprises aluminum oxide lacking in oxygen and the composition of an aluminum oxide is Al_2O_{3-x} where $0.03 \leq x \leq 0.3$.

10. (Original) A method of manufacturing a laser diode according to claim 9, further comprising the steps of:

a facet protection film or a facet reflection film having an aluminum oxide film lacking oxygen as a first layer on the semiconductor facet forming the optical resonator mirror; and

depositing the aluminum oxide film by a reactive sputtering method or an ion beam sputtering method of irradiating a metal aluminum target with plasma or ionic beams by using a gas mixture of an argon gas and an oxygen gas thereby causing film depositing reaction.

11. (Original) A method of manufacturing a laser diode according to claim 9, wherein the aluminum oxide film is deposited such that composition of argon intruded into aluminum oxide is 1 at% or less.

12. (Currently Amended) A semiconductor laser diode module wherein at least an optical lens for collecting light, an optical fiber for leading light to the outside and the laser diode ~~according to claim 1~~ having an optical resonator horizontally with respect to a substrate surface, comprising: a substrate of a semiconductor; an active layer formed inside the semiconductor; an optical resonator mirror formed on a semiconductor facet; and a reflection film comprising a first insulator film formed in contact with the semiconductor facet as the optical resonator mirror and an insulator film layered on the first insulator film; wherein the first insulator film comprises aluminum oxide lacking in oxygen and composition of aluminum oxide is Al_2O_{3-x} where $0.03 \leq x \leq 0.3$ are integrated.

13. (New) A laser diode according to claim 2, wherein the active layer comprises a material containing aluminum.

14. (New) A laser diode according to claim 13, wherein the aluminum content of the active layer has a compositional ratio of 10 at% or more relative to a group III element.

15. (New) A laser diode according claim 2, wherein total stress in the reflection film is 100 Pa·m or less.

16. (New) A laser diode according to claim 3, wherein total stress in the reflection film is 100 Pa·m or less.

17. (New) A laser diode according to claim 13, wherein total stress in the reflection film is 100 Pa·m or less.

18. (New) A laser diode according to claim 4, wherein total stress in the reflection film is 100 Pa·m or less.

19. (New) A laser diode according to claim 14, wherein total stress in the reflection film is 100 Pa·m or less.

20. (New) A laser diode according to claim 5, wherein total stress in the reflection film is 100 Pa·m or less.

21. (New) A laser diode according to claim 6, wherein total stress in the reflection film is 100 Pa·m or less.